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Investigation of predicted genes and the role of Manganese in the extreme radiation resistance of *Deinococcus radiodurans*

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ABSTRACT

The bacterium *Deinococcus radiodurans* is extremely resistant to ionizing radiation. How this organism is able to grow under chronic gamma-radiation or recover from acute doses greater than 10,000 Gy is unknown. The genes and cellular pathways underlying the survival strategies of *D. radiodurans* are under investigation, and its resistance characteristics are being exploited in the development of bioremediation processes for cleanup of radioactive US Department of Energy waste sites. The identity of the genetic systems underlying the repair processes in *D. radiodurans* remain poorly defined in spite of detailed global cellular analyses including whole genome sequencing and annotation, and transcriptome and proteome profiling of cells recovering from high-dose irradiation. Extensive mutant analyses have revealed few novel genes involved in radiation resistance. For an overview of this work see http://www.usuhs.mil/pat/deinococcus/index_20.htm. We have shown that *D. radiodurans* contains high intracellular manganese and low iron levels, and that Mn restriction sensitizes cells to irradiation. We propose that the unusually high Mn/Fe ratio of *D. radiodurans* facilitates survival by quenching oxidative stress during recovery. Collectively these findings support that *D. radiodurans* uses a relatively conventional set of DNA repair functions, but with greater efficiency than other organisms.

Other Abstracts on *Deinococcus*:

<http://www.ornl.gov/gtl2004/abstracts/Battista%20abstract.pdf>
<http://www.ornl.gov/gtl2004/abstracts/Venter1%20Abstract.pdf>
<http://www.ornl.gov/gtl2004/abstracts/Dovich%20abstract.pdf>